Orbit tax – mitigating space debris or aggravating economic disparity?

Atika Chaturvedi, Urvisha Kesharwani 2020-08-03T09:00:10

Since the launch of Russian satellite Sputnik-1 in 1957, the space industry has never looked back. Currently, there are about 20,000 satellites orbiting the earth, and with the private players like SpaceX and OneWeb in the market, it is estimated that by 2025 the space industry will be launching about 1,100 satellites per year. As mankind moves forward in the era of hyper-dependency on satellite supported technologies, the pollution known as space debris, caused due to congestion of satellites cannot be overlooked. The problem of space debris is growing with each passing second, creating risk of collisions in orbits around Earth. With the current technological advancements, the satellite operators are able to track space debris and manoeuvre operational satellites out of harm's way. However, with increasing risks of collisions, such technologies are getting more and more expensive.

In a report recently published by the Organisation for Economic Co-operation and Development (OECD), it has been estimated that, if such a trend continues, then the tracking and manoeuvring costs could go about 5%-10% or even higher of the total mission's cost for satellites. Despite several discussions on the international level regarding the issue of space debris, until now the solutions have mostly been scientific. A study ("Study") published earlier this year in the Proceedings of the National Academy of Sciences by Akhil Rao, Matthew G. Burgees, and Daniel Kaffine claims that the problem of space debris can be effectively tackled by levying 'Orbit Tax' on orbiting satellites. This article seeks to critically analyse the concept of orbit tax and highlight its adverse implications on the budding space industries around the globe.

Space debris majorly comprises of dead satellites orbiting the earth, components of rockets used to launch satellites, and even flecks of paint chipped off from wear and tear of satellites and their launching rockets. These pieces of debris move at about 30,000 kilometres per hour, releasing vast amounts of energy. Even a small piece of debris, as tiny as 1 millimetre, can cause an inoperable damage to a satellite. Congestion of such debris in the orbit increases the risk of collision and hence can be catastrophic. In 1978 Donald J. Kessler, a NASA scientist, pointed out that an increase in the number of space objects in the earth's orbit can create an environment where collisions among the space objects will become inevitable and will lead to a cascading effect. This phenomenon known as Kessler syndrome could render the lower orbit of the earth economically unviable and other orbits difficult to access. Based on this, a research was published in 2006 which predicted that with the current trend, the number of objects measuring 10 cm or larger in the lower earth orbit (LEO) will triple in 200 years, leading to 10 times increase in collisional probabilities among objects in this region.

Until now there has been little to no focus on developing legal regulations for mitigating the problem of space debris. The Outer Space Treaty (OST), that is considered to be the 'Magna Carta' of space law, is too generic to deal with the problem of space debris, though one clause of Article IX of the OST does obligate the states to inform and consult other states that can be affected by foreseeable potentially harmful consequences of space activities undertaken by the former state. Further, Article VII and Article VI of the OST provide jurisdictional power to the states over the space object registered in their national registry and binds them to bear international responsibility for national activities in outer space. However, this does not prohibit a state from generating space debris nor does it obligate them to remove such debris once it is created.

On the other hand, the Convention on International Liability for Damage Caused by Space Objects ("Liability Convention") sets up a regime of liability for damage caused by space objects. However, the Liability Convention only focuses on causation and damage rather than prevention or mitigation of space debris. Space Debris Mitigation Guidelines ("Guidelines"), adopted by UN in 2007, is the only international instrument solely dealing with the problem of space debris. But the non-binding nature of the Guidelines renders its compliance arduous.

Despite of the guidelines and various technological solutions, the growing problem of the space debris persists. The Study highlights that the core of the current problem is the dearth of incentives. Currently, the satellites are being launched without consideration of the collision risks they impose on other operators. Satellite operators are unable to secure exclusive property rights to their orbital paths or recover collision-related costs imposed by others. Hence, the operators end up facing two choices – either launching a profitable satellite and risk the future cost of collision or not launching the satellite and leave these profits to their competitors. This has led to what economists call the 'Tragedy of Commons', where the individuals acting in their own self-interest destroy a commonly shared resource.

The Study suggests that this problem can be curbed by incentive-based solutions, such as fees or tradable permits per year in orbit (orbit tax). This orbit tax will help to quantify the economic benefits of implementing de-orbiting technologies by the satellite operators with their respective satellites. Further, the added costs of operating satellites will influence the decisions of launching satellites in the orbit. The proposed tax or fees, as estimated by the Study, will quadruple the value of the satellite industry by 2040 making it a 3 trillion-dollar industry.

What is an Orbit Tax?

The proposed orbit tax is an internationally coordinated "orbital use fee" ("OUF") designed to sway the satellite launch decisions. This tax shall be collected annually on the orbiting satellite as it is the orbiting objects that directly impose collision risk on other satellites, as opposed to launching fees that are levied on satellites before launching. Such OUF shall be collected by the respective government under which the satellite is registered. OUF will act as a Pigouvian tax that is imposed to generate negative externalities by taxing the product correlated to externality. An example of such tax would be tax on carbon emissions, or plastic bags. Through this mechanism

the cost of the externalities is borne by the producer that generates such externality. The OUFs might vary depending upon the factors that determine the collision risk of one satellite with another. Such factors include the orbital path and altitude of the satellite, its structure and the ownership design.

Is Orbit tax a tenable solution?

While the concept of orbit tax presents itself to be a good solution in order to combat the problem of debris and over-crowding in space, it is not free from shortcomings. To begin with, a crucial problem lies in the task of all the States agreeing upon a uniform rate. The difficulty in reaching such an agreement between the States is overlooked by the proponents of OUF. It has been proposed that this tax can be implemented in a manner similar to how the parties to the Nauru Agreement follow the Vessel Day Scheme to facilitate tuna fisheries, however, this agreement is regional, whilst, the OUF model, for its effectiveness, is required to be implemented globally.

Furthermore, it cannot be ignored that the international community has still not been able to establish any precedent of harmonised taxation or fees. Uniform carbon taxation, which has been under discussion for years, is yet to be negotiated as an internationally binding agreement among the sovereign states. Another example of such failure in economic global cooperation can be noticed in the recent collapse of the OPEC pact, which led to oil price wars. Nevertheless, the current adoption of carbon taxation is far from being uniform. If such haphazard implementation of the OUF model occurs, then it would give rise to more problems like emergence of Tax Havens. This will render the whole objective of the OUF model futile.

Moreover, the vast disparity in the economic status of developed and developing countries. The dependence of states on satellites ranges from defence to entertainment, and satellites play a huge role in the development of a country. The young space programmes of developing nations are prone to challenges like questionable long-term political support and funding cutbacks or cancellations. Whereas, developed nations receive huge funding to advance their space technologies. The disparity stems from the very fact that in 2018 the budget of US space industry was $40.9 billion, which was 58% of the total budget of the world. Further, most developing countries still do not have basic space technologies and have to pay extortionate costs to developed countries for acquiring it. Levying a fixed tax can further widen the 'Space Gap', i.e. the gap formed due to the difference in capabilities between developed and developing nations with regards to technological and economic access to space. Taking this into account, it can be considered unjust to subject developing countries to the same rate as developed countries. The implantation of the OUF model can potentially disincentivize the nascent space industries of many developing countries from expanding their space technologies and exploring space consequently placing the developed countries at an unfair advantage.

Moreover, in terms of interdependency between countries, the space industry is one of the more global industries in the world. The satellites are made in one country, launched and operated from other countries, and services are used by more than

one country. In such a scenario, increasing the total cost of operating a satellite will increase the cost of services provided by the satellite. Such an increment in cost will affect the global citizens regardless of their nationality and economic status. In an age where the dependency on satellite-based technology is increasing every day, this would not be considered as a welcome change.

Another aspect that has been ignored by economists is that space debris does not relate to operational satellites. The core problem of space debris arises from non-manoeuvrable debris. Taxation may incentivise the operators to de-orbit unusable satellites, but such a task can also be achieved by formalising a binding treaty on space debris. Increasing the overall cost of the space industry seems nugatory. Additionally, such a treaty can also be formulated to address the key problem i.e. high-risk orbital behaviour of already existing non-manoeuvrable debris, which has not been addressed by the Study.

Conclusion

As the orbital space around the Earth gets crowded due to human activities, the pressing need of the hour is to come up with solutions to mitigate space debris. Without proper steps, the state of space will not improve in the near future. The proposed OUF model can be implemented in furtherance of carrying out the objective entailed in Article VI and Article IX of the OST, which obligates the states to bear international responsibility for national activities in outer space and to avoid harmful contamination and adverse changes in the environment of the earth due to space activities through international cooperation. Although the OUF model can prove to be an effective tool to influence behaviour, it is still riddled with major flaws. A more balanced solution should be formulated to curb the problem of space debris, whilst simultaneously not hampering the growth of the nascent space industries.

Urvisha Kesharwani (B.A. LL.B. (Hons.)) and Atika Chaturvedi are students at National University of Study and Research in Law, Ranchi.

Cite as: Urvisha Kesharwani & Atika Chaturvedi, “Orbit tax – mitigating space debris or aggravating economic disparity?”, *Völkerrechtsblog*, 3 August 2020.